

UNIVERSITY OF CALIFORNIA.

AGRICULTURAL EXPERIMENT STATION.

BULLETIN NO. 27.

[In order to render the results of investigations and experiments conducted by the Agricultural Department of the University of California more quickly and more generally available than has heretofore been done through the annual or biennial reports, it is proposed to embody hereafter, in the form of "Bulletins," to be issued as often as may seem desirable, reports of results, as well as such other discussions, information or answers to questions as may be of general interest. It is intended to make these bulletins, as a rule, short enough for insertion in the daily or weekly papers of the State, and proof-slips of the same will be regularly mailed to papers applying therefor. The substance of these bulletins will ultimately be embodied in a more complete and connected form, in the annual reports of the College of Agriculture.]

Examination of Soils from the Northern Coast Range Region.

Valley soil, from the higher ground in the Napa valley, two miles south of St. Helena. A dark-gray loam soil, largely intermixed with rock fragments (mostly soft yellow sandstone, partly angular bits of shale, both rocks occurring on the adjacent hills), and some rounded gravel, amounting to 21.7 per cent. of the soil. There is a change of color to a lighter hue at twelve inches, and at from two to two and a-half feet there underlies a somewhat close and more clayey material, with fewer rock fragments. In this respect the land differs from that lying farther south, near Oakville, where the depth of the looser material is greater, and oftentimes gravel underlies it at from four to five feet; otherwise the soil is probably substantially the same in its chemical nature.

Soil from Vaca valley, understood to be from the bench land; sent by Mr. D. Rutherford, of St. Helena, with this question: "This soil grows apricots and cherries to perfection in Vaca valley. What does the soil of this region (presumably such as No. 672 above) need to make it like this."

While it is not always to be expected that chemical analysis can answer such a question, the soil sent was subjected to analysis, as no sample from Vaca valley had thus far been received. The soil is a grayish-dun, rather sandy loam, dry lumps crushing easily with the finger; nevertheless, when wetted it shows considerable clay in becoming quite plastic when worked. Of course it is very easily tillable, and known to be several feet in depth without

material change. Only 1.7 per cent of sand remained on the sieve with 1.56-inch meshes. The analysis of the fine-earth is given in the table, alongside of that of the Napa valley soil, for comparison.

	NAPA VALLEY SOIL—No. 672.	VACA VALLEY SOIL—No. 699.
Insoluble Matter.....	77.02	68.76
Soluble Silica.....	3.34	12.15
Potash.....	.75	.74
Soda.....	.48	.12
Lime.....	.60	.58
Magnesia.....	1.33	1.07
Br. Oxide of Manganese.....	.04	.05
Peroxide of Iron.....	5.66	6.01
Alumina.....	5.67	6.23
Phosphoric Acid.....	.10	.03
Sulphuric Acid.....	.05	.02
Water and Organic Matter.....	5.25	4.23
Total.....	100.29	100.14
Humus.....	1.67	1.00
Available Inorganic.....	.46	.25
Hygrosco. Moisture.....	4.50	6.07
Absorbed at.....11° C		13.5° C

The table shows that these two soils happen to be very much alike in all essentials of chemical composition save one, viz., phosphoric acid, which is over three times as abundant in the Napa valley soil as in that of Vacaville, being quite deficient in the latter. Assuredly, however, the presence of that essential article

of plant food would not interfere with the success of cherries. The difference doubtless depends in the main upon two points, of which the analyses can say nothing: First, the climate, which cannot be transported or changed; second and probably most essentially, the fact that (as has been shown on Mr. Wheeler's very land) the laying of underdrains is very beneficial even to vines in that portion of the Napa valley, and therefore, of course, much more needful for cherries. The latter as well as apricots seem to do well, however, in the deeper and naturally well drained soils near Oakville. It is therefore probable that underdrainage, to relieve the subsoil from all stagnant water, taking even the wettest seasons, would be the measure best calculated to make cherries succeed in the St. Helena soil. Both soils alike are rich in potash and lime, with abundance of humus in the Napa soil and a good supply in that of Vacaville. Both also are of good physical constitution, and of easy tillage. But the Vacaville soil will, before long, need the aid of phosphate fertilizers.

No 779. — *Gray valley soil* from near Winters, Yolo county; sent by Mr. J. C. Wyer, of Winters. The soil as received forms rather hard lumps, and should be designated as a clay

loam or light adobe, the lumps being barely capable of being crushed between the fingers. On wetting, it softens rather slowly, but completely, and is then evidently readily tillable. Mr. Wyer remarks that it is necessary to harrow this soil very soon after plowing, otherwise it will remain rough for the season. From other samples sent by Mr. Wyer it appears that in some places the surface soil is considerably heavier—true gray adobe—but is then underlaid at about 16 inches depth by a material lighter in color as well as in texture, which then continues to the depth of three feet, as far as seen. On some of this soil the earliest peaches are produced. At the spot where the sample analyzed was taken, the soil seems to continue the same for three feet, also; but the sample was taken to the depth of 20 inches only. "It seems to contain no coarse materials whatsoever. The samples sent I think are a fair average of thousands of acres in this section, but the land seems to change as you go west and north. The lands west, near the foothills, produce the early vegetables sent to San Francisco, and is lighter, having a reddish, gravelly soil. At the same time it is good grain land; the land north is adobe, but is strong wheat land." The analysis resulted as follows:

No. 779—GRAY SOIL FROM WINTERS.

Insoluble Matter.....	56.78	} 74.37
Soluble Silica.....	17.59	
Potash.....		.88
Soda.....		.17
Lime.....		.86
Magnesia.....		3.05
Br. Oxide of Manganese.....		.07
Peroxide of Iron.....		4.46
Alumina.....		10.81
Phosphoric Acid.....		.09
Sulphuric Acid.....		.02
Water and Organic Matter.....		5.21
Total.....		99.99
Humus.....		.85
Available Inorganic.....		.43
Hygroskop Moisture.....		7.31
Absorbed at.....	12° C	

This is altogether a "strong" soil, with a high percentage of potash, a good one of lime, a fair one of phosphoric acid and of humus; in fact, considering that the sample was taken to the depth of twenty inches and that humus rarely reaches beyond twelve, the percentage if given for the soil proper would be one-half higher. If kept deeply and thoroughly tilled, it would be a very durable soil, well adapted to most fruits except cherries. Where it is heavier than the sample, the use of lime would doubtless be an advantage in facilitating tillage.

E. W. HILGARD.

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